Tailored Arrival Environmental Benefits Harmonization Status

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AEDT Fuel Consumption Methods

- Integrated Noise Model – based performance below 10,000 feet
  - Data from manufacturers
- Base of Aircraft Data (BADA) above 10,000 feet – and fuel consumption data
  - Data from EUROCONTROL
- Aviation Environmental Design Tool methods for in-production Boeing aircraft fuel consumption below 10,000 ft

Atlantic Interoperability initiative to Reduce Emissions (AIRE)

- Tailored Arrivals
  - Miami arrivals from Europe (Lufthansa and Air France)

Asian and South Pacific Initiative to Reduce Emissions (ASPIRE)

- Tailored Arrivals
  - San Francisco arrivals from Australia and New Zealand (United, Qantas, Air New Zealand

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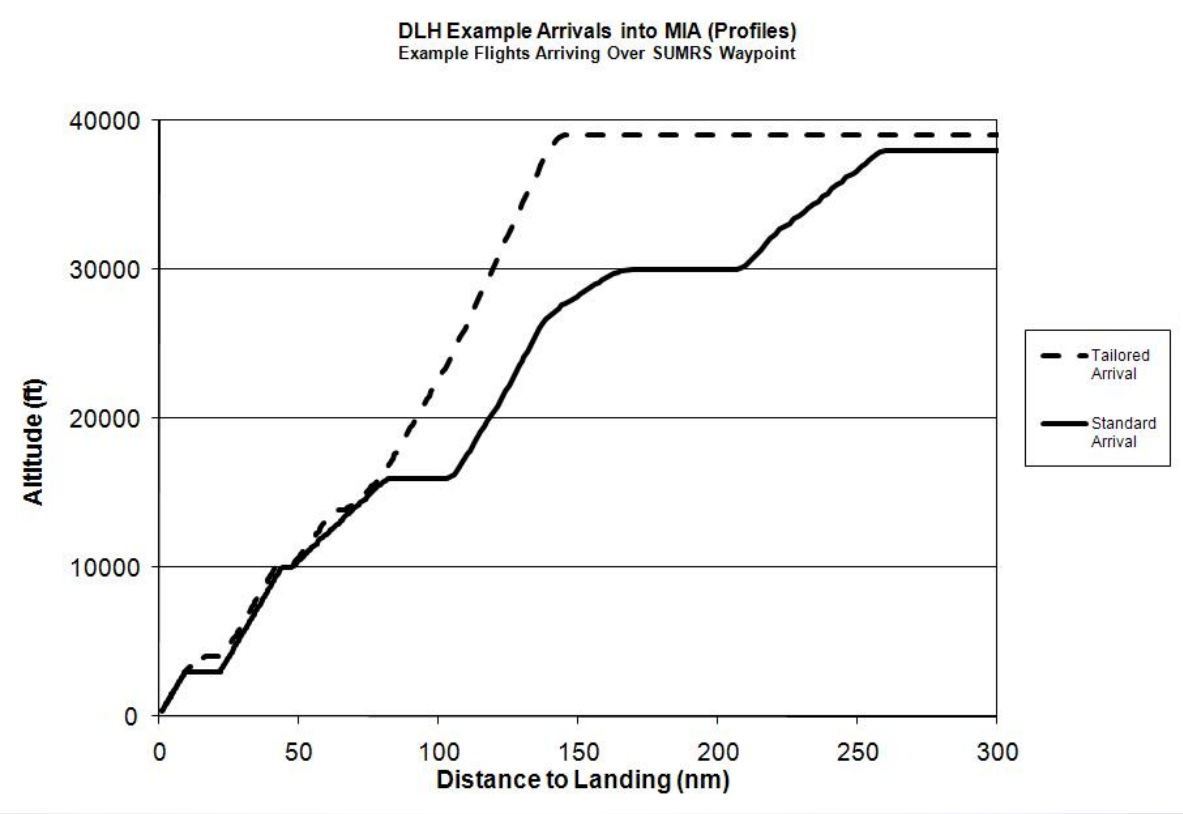
Atlantic Interoperability Initiative to Reduce Emissions

- Tailored Arrivals reduce fuel consumption by keeping the aircraft higher before starting the en-route descent



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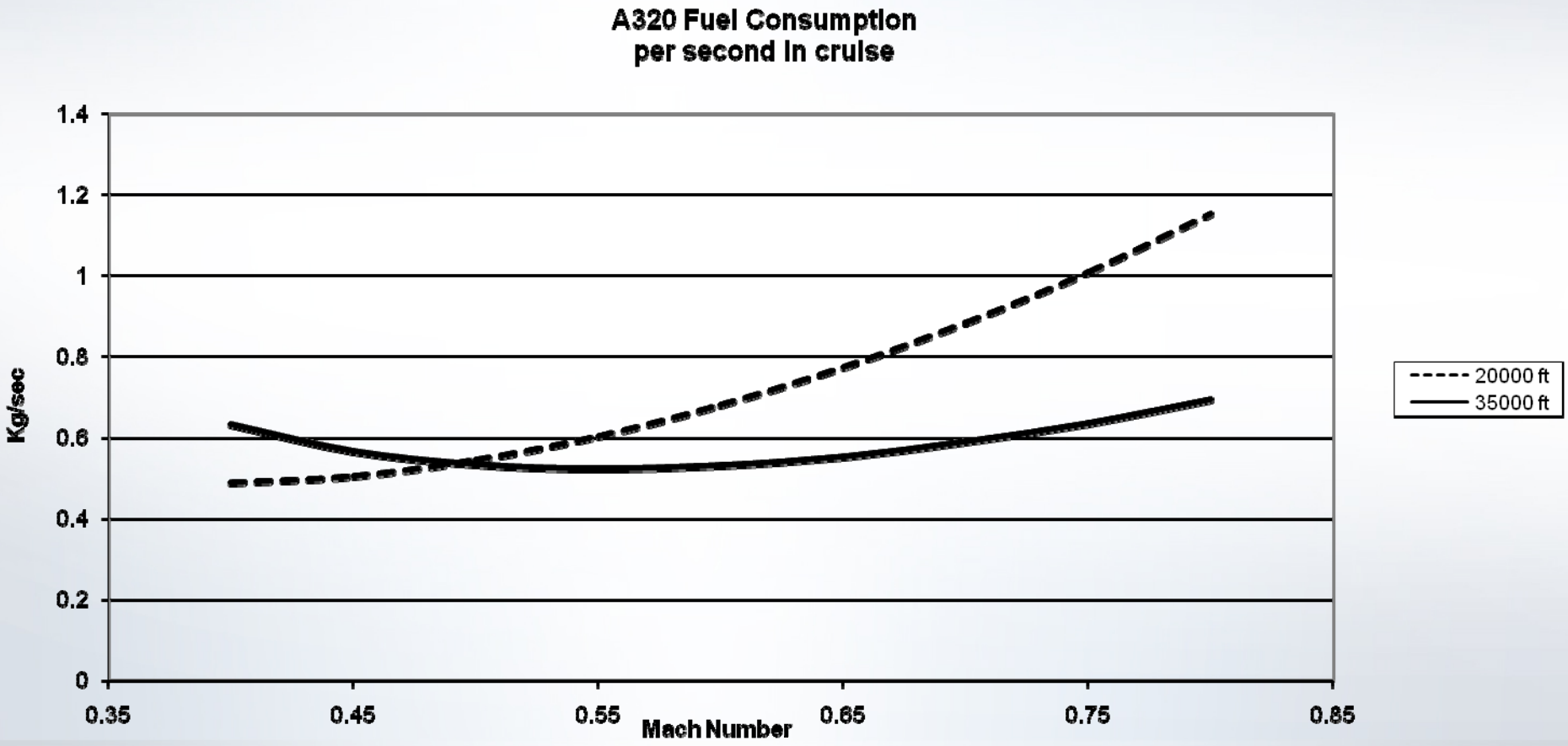
Fuel Consumption per unit of time



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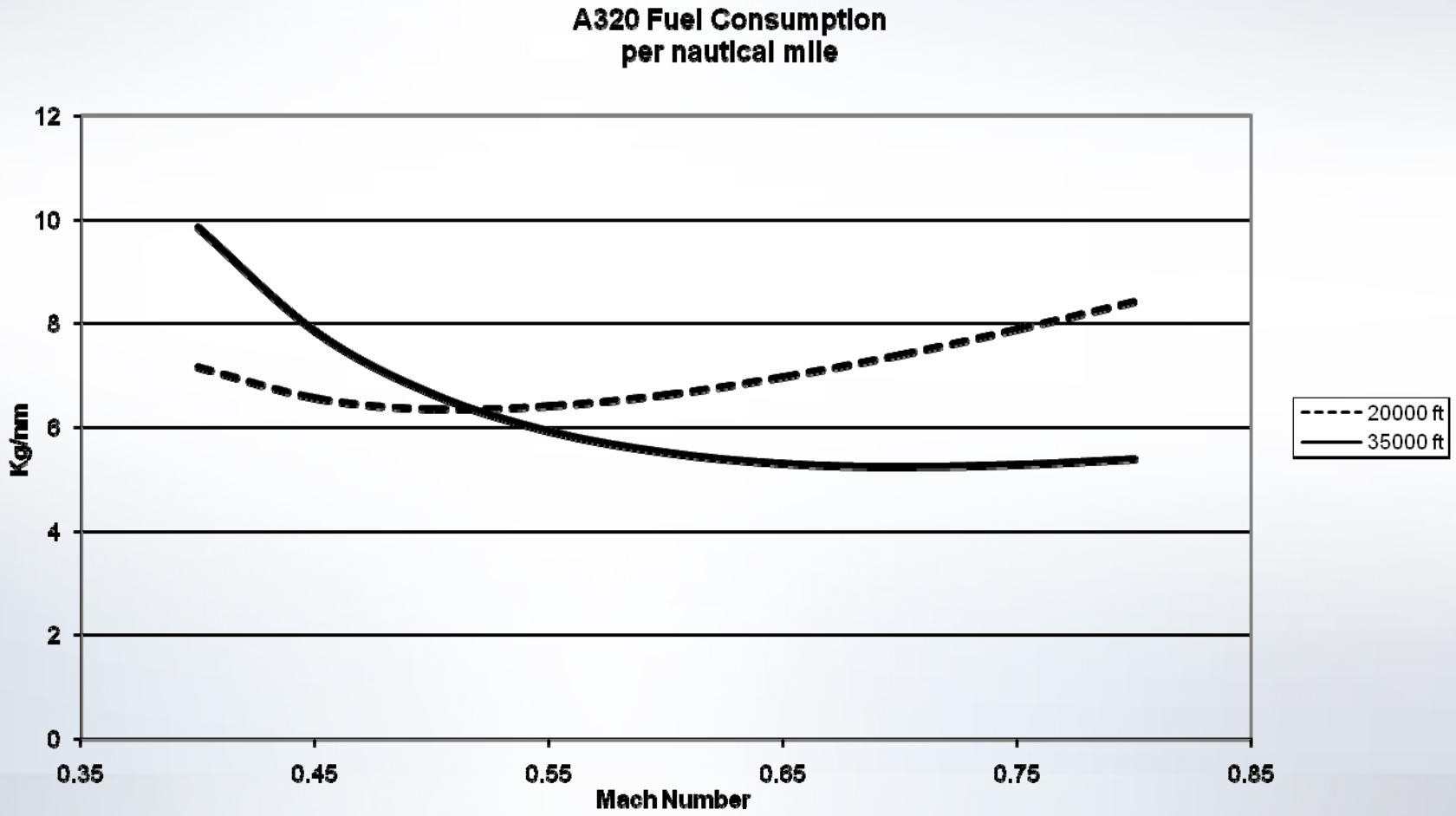
Fuel Consumption per unit of distance



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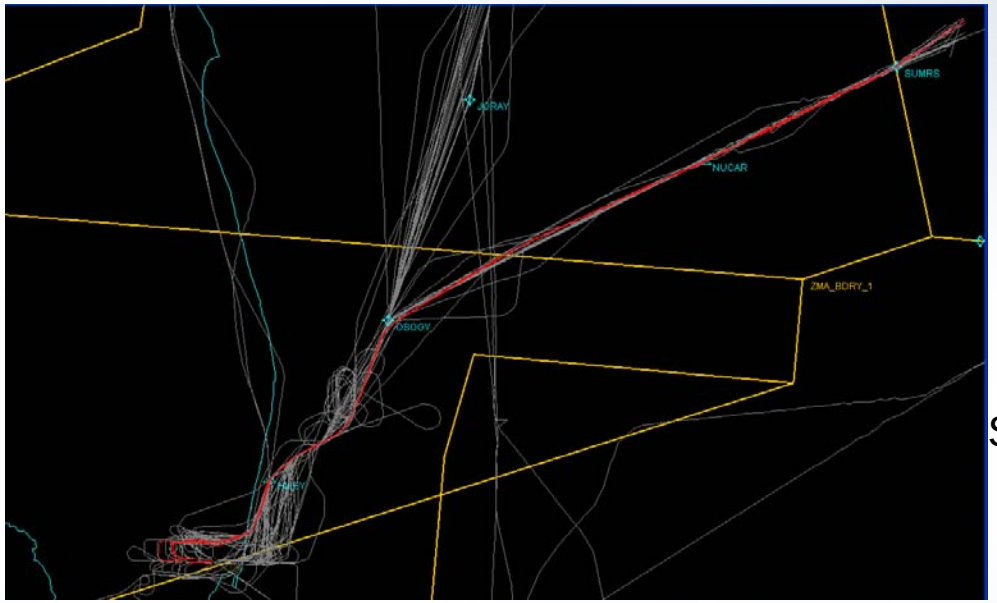

Red Tracks
TA routes

Grey Tracks
Standard arrivals

Aircraft Type	SUMRS Standard Arrival	Tailored Arrival	Difference	Difference (%)
747-400 (carrier A)	4171 kg (9196 lb)	3820 kg (8422 lb)	-351 kg (-774 lb)	-8.2%
747-400 (carrier B)	4425 kg (9754 lb)	4027 kg (8878 lb)	-398 kg (-877 lb)	-9.0%

The fuel consumption represents flights from the SUMRS waypoint; 1 nm track distance savings

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AIRE - MIA

- Fuel savings on the order of 700 – 800 lb

ASPIRE - SFO

- Fuel savings on the order of 2000 lb

Why the differences?

- Modeling comparison started to look at the differences in detail

AIRE/ASPIRE Model Comparison

AEDT

- AEDT is intended for radar or simulator data inputs (TAAMS, ACES, SIMMOD, etc)
  - The current Alpha & Beta version has no tools to allow the user to build profiles

Boeing Tools

- Boeing Performance Software (BPS) is intended for user inputs
  - The user defines the state parameters of the aircraft during the modeled approach

Steps to run the comparison

- Tools written for AEDT to over-ride the radar data with user-defined profiles

- Common flights parameters for comparison:
  - Cruise at 37,000 MSL
  - Descent speeds of 280 knots above 10,000 ft, 240 knots below
  - Level segments of 15 nm, at 20,000 and 8,000 MSL for the baseline

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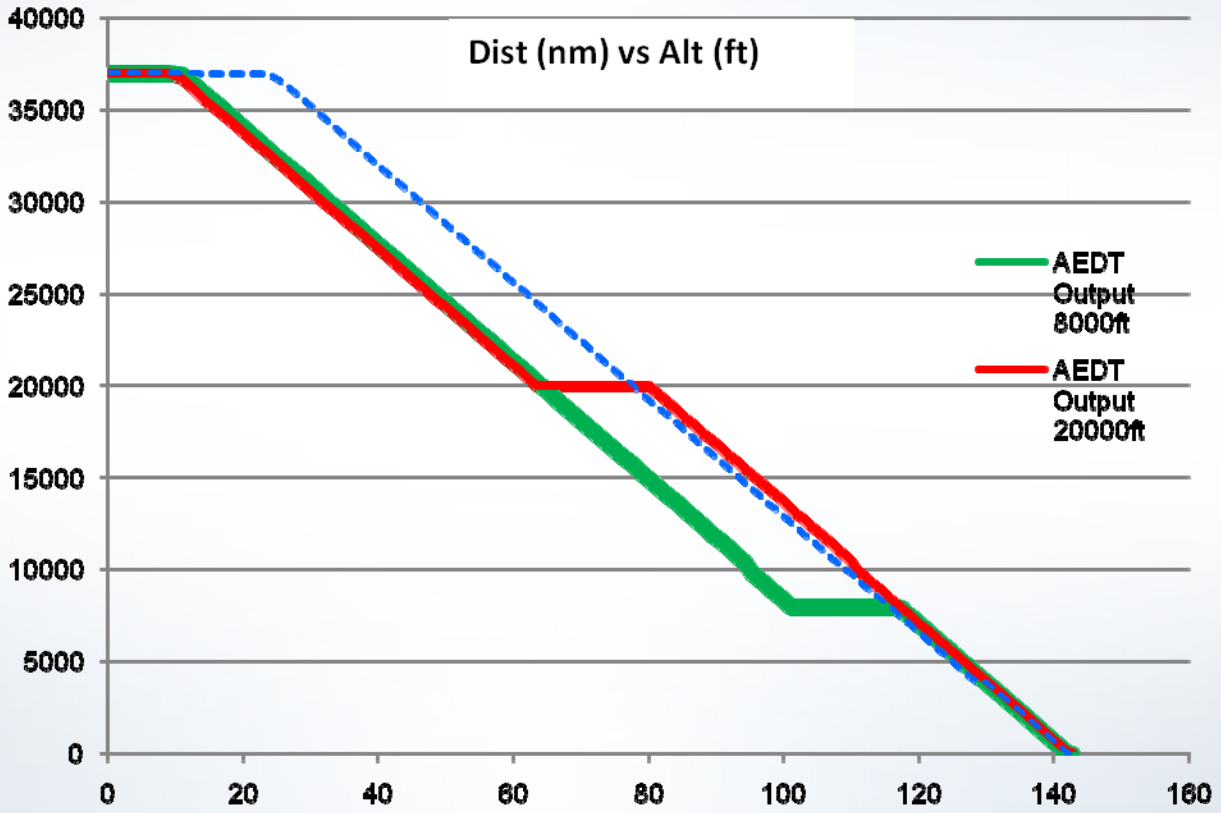

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Modeling results for 747-400

Nominal flight	AEDT	BPS	Difference
Baseline 1 (8,000’ level)	1311 kg (2890 lb)	1347 kg (2970 lb)	-36 kg (-80 lb)
Baseline 2 (20,000’ level)	1229 kg (2709 lb)	1236 kg (2724 lb)	-7 kg (-15 lb)
Tailored Arrival	1077 kg (2374 lb)	1163 kg (2563 lb)	-86 kg (-189 lb)

Difference	AEDT	BPS
Baseline 1– Tailored Arrival	234 kg (516 lb)	185 kg (408 lb)
Baseline 2 – Tailored Arrival	152 kg (335 lb)	73 kg (161 lb)

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Lessons learned

- Methods document
  - Common definition of starting point
  - Common weight of aircraft
  - Report track distance differences between non-TA and TA flights

- For the SFO/MIA comparison, SFO has an average of 15 nm of vectoring (additional track distance)
  - The SFO vectoring contributes about 1000 lb of fuel consumption to the baseline
  - At MIA, the TA baseline contains no vectoring

Next Steps for AEDT

- FAA/Boeing agreement to exchange models
  - Expand current model to include more aircraft types (e.g. 777-200 performance data below 10,000 ft)
  - Improve modeling of Boeing aircraft above 10,000 (all are currently based on EUROCONTROL, not directly from Boeing tools)